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A SEX PHEROMONE IN THE CALIFORNIA OAKWORM *PHRYGANIDIA CALIFORNICA* PACKARD (DIOPTIDAE)

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ABSTRACT. California oakworm (*Phryganidia californica*) virgin females confined to sticky traps attracted significantly more males than unbaited control traps. This demonstrates the presence of a sex attractant in this species.

The California oakworm (COW), *Phryganidia californica* Packard, the only species of the family Dioptidae in America north of Mexico, is a major defoliator of oaks in California (Essig, 1958; Brown & Eads, 1965). Previous studies (Harville, 1955; Sibray, 1947) have shown that COW populations erupt sporadically, but the causes of these eruptions are presently unknown. Attractive pheromones, should they exist, could provide a means of detecting sparse populations and incipient outbreaks and determining the distribution of this species (Daterman, 1978; Cardé, 1979).

Here we report results that indicate the presence of a female produced sex pheromone in this species.

Materials and Methods

The study was carried out in October 1982 in a ca. ¼ hectare stand of California live oaks (*Quercus agrifolia* Neé) on the University of California campus, Berkeley. Adults used in these trials were field collected pupae which were confined individually to 90 × 23 mm shell vials plugged with cotton wool. The insects were reared under a natural photoperiod in the laboratory and allowed to emerge in these vials.

Pherocon 1C® (Zoecon Corp., Palo Alto, CA) sticky traps were used in all trials. Traps were baited by confining one virgin female to a cylindrical (6 × 12 mm) steel mesh cage suspended from the trap roof. A 5 ml water vial plugged with cotton was also included in cages. Control traps were each fitted with a cage containing a water vial but no female. Traps were placed in arbitrarily selected California live oaks, hung between 2 m and 4 m above ground, and at least 8 m apart.

In the first trial, 10 traps were baited with females which had emerged from pupae 0–24 hours prior to the experiment. Ten control traps were also deployed. In the second trial, eight traps were baited with females which had eclosed 12–24 hours prior to the experiment, 12 with females that eclosed 24–36 hours prior to trap placement and 10 unbaited traps served as controls. In each trial traps were examined 24 hours after they were deployed.

TABLE 1. Male moths caught by traps baited with virgin females and unbaited controls.

	Female age (hours)*	Number of traps	Mean catch	Standard deviation	Range
Trial I	Control a	10	0.1	0.3	0–1
	0–24 b	10	23.7	29.3	0–70
Trial II	Control a	10	0.1	0.3	0–1
	12–24 b	8	66.4	41.4	0–114
	24–36 b	12	55.4	46.5	0–126

* Within trials, treatments (female age at trap deployment) followed by the same letter are not significantly different ($\alpha = 0.05$).

RESULTS

The number of males caught in each trap for a particular trial was ranked and these data were analyzed by means of the Mann-Whitney test (Conover, 1971, p. 224). In each trial, traps baited with virgin females caught a significantly greater number of males than unbaited controls (Table 1). In the second trial, although the number of male moths caught in traps baited with the younger females caught more males than the older females, this difference was not significant. In both trials, some females failed to attract moths (Table 1).

Since baited traps caught a significant number of moths and all COW moths trapped were males, these results demonstrate the presence of a sex attractant in this species. Thus, attempts to extract, isolate, and identify the active secretions seem justified, not simply because of the economic importance of this species, but also because of its unique position among North American Lepidoptera.

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